West Sacramento GRR EIS/EIR
Appendix F

Final 404 (b)(1) Analysis

This page intentionally left blank

SECTION 404(b)(1) WATER QUALITY EVALUATION

WEST SACRAMENTO PROJECT
GENERAL REEVALUATION REPORT

YOLO COUNTY, CALIFORNIA

This document constitutes the Statement of Findings, and review and compliance determination according to the Section 404(b)(1) guidelines for the proposed project described in the final EIS/EIR issued by the Sacramento District. This analysis has been prepared in accordance with 40 CFR Part 230- Section 404(b)(1) guidelines and USACE Planning Guidance Notebook, ER 1 105-2- 100.

I. Project Description

a. Proposed Project

Information on alternatives is taken from Section 2.0 of the final Environmental Impact Statement/Environmental Impact Report (EIS/EIR).

The West Sacramento General Reevaluation Report (GRR) project is a cooperative effort by the U.S. Army Corps of Engineers (Corps) and the Corps' non-federal sponsors the West Sacramento Area Flood Control Agency (WSAFCA). The Corps has completed a final EIS/EIR, dated September 2015. The final EIS/EIR will be referenced throughout the document to describe the existing conditions near the project site, as well as some potential impacts of the proposed project and the other alternatives.

The primary and permanent structures consist of roughly 50 miles of levees surrounding the City of West Sacramento. Staging areas on the landside of the levees would be cleared for construction use and concrete batch plants would be constructed on the landside of existing levees as necessary temporary structures to facilitate the construction of slurry walls along levee reaches.

The proposed project would require discharge of dredged or fill material into waters of the U.S. under Section 404 of the Clean Water Act. The following subsections describe the measures proposed for all three alternatives and identify any possible discharge of fill material associated with each measure. Additional information about the measures can be found in Section 2.1.3 of the final EIS/EIR

Seepage and Slope Stability Measures – To address seepage and slope stability concerns, several measures have been proposed including seepage or stability berms, construction of adjacent levees, construction of a setback levee and slurry cutoff walls. The slurry cutoff walls would be installed by one of two methods: (1) conventional open trench cutoff walls, or (2) deep soil mixing (DSM) cutoff walls. The method of cutoff wall construction selected for each reach would depend on the depth of the cutoff wall needed to address the seepage. The open trench method can be used to install a cutoff wall to a depth of approximately 85 feet. For cutoff walls of greater

depth, the DSM method would be utilized. Prior to construction of the cutoff wall, the construction site and any staging areas would be cleared, grubbed, and stripped. The levee crown would be degraded up to half the levee height to create a large enough working platform (approximately 30 feet) and to reduce the risk of hydraulically fracturing the levee embankment from the insertion of slurry fluids.

Cutoff walls are proposed along the Sacramento River, the DWSC, and the Yolo Bypass. Because the cutoff wall would be installed directly into the levee, no fill material would be placed into waters of the U.S. by implementing this measure.

A seepage berm or stability berm would be constructed along the Sacramento River south levee and the South Cross levee in areas where it has been determined by geotechnical investigations that a seepage berm is more appropriate to address seepage than a cutoff wall. The seepage berm would extend out from the landside levee toe and would vary in width from 70 to 100 feet, tapering down from a five foot thickness, at the levee toe, to a three foot thickness, at the berm toe. The length of the seepage berm would depend on the seepage conditions along the levee reach. A stability berm would be constructed against the landside slope of the existing levee with the purpose of supplying support as a buttress. A stability berm is proposed along the South Cross levee. The height of the stability berm would generally be 2/3 of the levee height, and would extend for a distance determined by the structural needs of the levee along that reach. Construction would consist of clearing, grubbing, and stripping the ground surface. Depending on the action alternative, soil used to construct a berm would be stockpiled from levee degradation, excavated from nearby borrow pits, or trucked on site from off-site locations (if on-site material is not adequately available). During the degrading, soil would be stockpiled at the proposed berm site.

Construction of the seepage and stability berms would be installed on the landside of the levee to minimize placement of fill into waters of the U.S. However, there are wetlands and drainage canals along the toes of the South Cross levee and the Sacramento River south levee that would be impacted by construction of seepage and stability berms. The berms would be designed to avoid placement of fill in waters of the U.S. to the extent possible.

Constructing an adjacent levee is proposed along some sections of the Sacramento River south levee. The adjacent levee essentially adds material to increase the cross section of the levee, thereby allowing the prescribed 3:1 landside slopes and 20-foot-wide crown to be established. The adjacent levee would be constructed on the landward side of the levee and would make it possible to leave all waterside vegetation in place and minimize placement of fill into waters of the U.S. However, there are wetlands and drainage canals along the toe of the Sacramento River south levee that

would be impacted by construction of adjacent levees. The adjacent levee would be designed to avoid placement of fill in waters of the U.S. to the extent possible.

Construction of a setback levee is proposed for the Sacramento River south levee as part of Alternative 5. The typical offset distance of the setback levee from the existing levee is approximately 400 feet with a total length of roughly 4.25 miles, encompassing about 180 acres. The setback levee would include seepage berms in areas where it has been determined by geotechnical investigations that they are necessary to further reduce seepage. Some sections of the existing levee may be degraded to allow flow between the existing levee and the proposed setback levee.

Construction of the setback levee would cause temporary and permanent impacts to wetlands including drainage canals but would be designed to minimize impacts to waters of the U.S.

Overtopping Measures – Floodwalls are proposed along the waterside hinge point of the Port north levee and along the selected levee alignment around the Port of West Sacramento to reestablish height consistent with the system height. Construction activities would cause a temporary disturbance to provide space to construct the footing for the floodwall. Upon completion of the floodwall the waterside slope would be re-established to its existing slope and the levee crown would grade away from the wall and be surfaced with aggregate base. Levee raises would also occur on the Port South levee and the South Cross levee to reestablish system height and establish system height respectively. Additional material to increase levee height would be brought from nearby borrow sites, stockpiled in staging areas then hauled to the site with trucks and front end loaders. Material would be spread evenly and compacted according to levee design plans. The levee would be hydroseeded once construction was completed.

Construction activities would cause temporary and permanent impacts to waters of the U.S. at the toe of the existing levee as the levee footprint is increased to accommodate the increased levee height. The levee and staging areas would be designed to avoid placement of fill in waters of the U.S. to the extent possible.

Erosion Protection Measures - To reduce erosion concerns, bank protection would be placed on the waterside of levee slopes, along the river bank, and in the water along the Sacramento River levees, the Sacramento Bypass Training levee, and the DWSC west levee. Placement of rock would require clearing of understory vegetation and some trees along the Sacramento River levees. Construction could cause the displacement of soil, the introduction of contaminants, and the placement of up to 2 tons of rock into waters of the U.S.

Construction of a Deep Water Ship Channel (DWSC) Closure Structure As part of Alternative 3, a closure structure has been proposed. To enable construction of a closure structure, a temporary staging area with a batch plant and graving site would be constructed adjacent to the DWSC. Dredging the footprint of the closure structure is required to create a stable foundation prior to construction. The proposed closure structure, would involve the discharge of dredge material and rock material into approximately 16 acres of waters of the U.S.

b. Location

Location information is taken from Section 1.2 of the final EIS/EIR.

The West Sacramento GRR study area is located in the city of West Sacramento in eastern Yolo County at the confluence of the American and Sacramento Rivers. The city lies within the natural floodplain of the Sacramento River, which bounds the city along the north and east. In this document, the "project area" consists of the area that would be protected by the proposed levee improvements, including the city of West Sacramento itself, and the lands within WSAFCA boundaries, which encompass portions of the Sacramento River, the Yolo Bypass, the Sacramento Bypass, and the Sacramento DWSC. The DWSC and barge canal bisect the city into two subbasins, separating the developing Southport area from the more established neighborhoods of Broderick and Bryte to the north. The two subbasins are broken up into nine levee reaches based on location and fixes.

c. Purpose and need

The project purpose and objective is to provide flood risk management to the City of West Sacramento. Providing flood risk management would reduce loss of life and damage to property in the project area.

The Corps identified underseepage as an area of concern following storms in 1997 and, prompting levee reconstruction in the West Sacramento area between 1998 and 2002. Only recently, however, has the Corps issued revised Federal levee design criteria (Section 2.1.3) to provide a consistent approach for addressing potential levee underseepage. Recent engineering analysis has resulted in the identification of levees that don't meet Corps standards and the necessary improvements to provide an urban level of flood protection to West Sacramento. Changes in engineering standards that account for underseepage affected the level of performance for the completed West Sacramento Project. Hydraulic analysis also determined that the area is vulnerable to flooding in a less than 100-year flood event. While Federal standards were changing, the State of California also began developing new standards and criteria for protecting

urban areas to reduce flood risk. Bringing the West Sacramento project levees up to these standards would reduce risk of uncontrolled flooding in the study area that could result in significant damages and loss of life.

d. Authority

The study authority for the West Sacramento area was provided through Section 209 of the Flood Control Act of 1962, PL 87-874. The West Sacramento Project was authorized in WRDA 1992, PL 102-580 Sec. 101 (4), as amended by the Energy and Water Development of 1999, PL 105-245. The current estimated cost of the authorized project is $53,040,000 under WRDA 2010, PL 111-85. The allowable (Sec. 902) cost limit is $63,648,000 under Energy and Water development Appropriations Act, 2010, PL 111-85, Sec 118.

e. Alternatives [40 CFR 230.10]: Unless otherwise noted, the information is from the September 2015 final EIS/EIR.

(1)No action:

The No Action Alternative serves as a benchmark against which the effects and benefits of the action alternatives are evaluated. The No Action Alternative assumes that current conditions and operation and maintenance practices would be expected to continue to occur in the foreseeable future if the project were not implemented, based on current plans and consistent with available infrastructure and community services. The No Action alternative would have no impacts to wetlands or other waters of the U.S., however, this would not achieve the flood risk management objectives of the project, leaving the City of West Sacramento at risk. Enhanced public safety would also not be realized. This alternative is not practicable, as it would not meet the purpose and need of the proposed project.

(2) Other project designs:

Alternative 1 - **Improve Levees.**

Alternative 1 would include the construction of levee remediation measures to address: (1) seepage, (2) slope stability, (3) overtopping, and (4) erosion concerns identified for the Sacramento River, South Cross, DWSC, Port, Yolo Bypass, and Sacramento Bypass training levees. Plate 2-3 in the final EIS/EIR identifies the reaches where each measure would be required under Alternative 1. Levees would be improved through a combination of fix in place and adjacent levee construction. A description of the measures identified and construction methods can be found in Section 2.1.3 of the final EIS/EIR. Once a levee is modified, regardless of the measure implemented for the

alternative, the levee would be brought into compliance with Corps levee design criteria. A full description of Alternative 1 can be found in Section 2.3 of the final EIS/EIR.

This alternative has been retained as a potential alternative. Therefore, this alternative will be retained as a practicable alternative and an evaluation of the impacts of Alternative 1 will be discussed throughout this document in order to determine if it is the least environmentally damaging practicable alternative (LEDPA).

Alternative 3 - Improve Levees and DWSC Closure Structure.

Alternative 3 would include all of the levee improvements discussed in Alternative 1, except that levee repairs on the Port north and Port south levees and portions of the DWSC east and west levees would be replaced by the construction of a closure structure in the DWSC. The Sacramento River, Yolo Bypass, and South Cross levees would be improved to address identified seepage, slope stability, erosion, and height concerns. The construction of a closure structure in the DWSC would provide flood protection to the Port of West Sacramento and the areas of the City located north of the structure, while eliminating miles of levee improvements both north and south of the closure structure. This is the only identified measure that would provide flood protection to the Port of West Sacramento, but it would require in water construction and the placement of dredge or fill material in waters of the U.S. A full description of Alternative 3 can be found in Section 2.4 of the EIS/EIR.

This alternative is considered practicable and will be retained. An evaluation of the impacts of Alternative 3 will be discussed throughout this document in order to determine if it is the least environmentally damaging practicable alternative (LEDPA).

Alternative 5 - Improve Levees and Sacramento River South Setback Levee.

Alternative 5 would include the levee improvements discussed in Alternative 1, except for the levee fix along the Sacramento River south levee. Instead of the fix in place and/or adjacent levee fix along the entire reach, levee repairs would include the construction of a new setback levee. The setback levee would be roughly 5 miles long and would be constructed roughly 500 feet west of the existing levee. This alternative would reduce the amount of bank protection placed on the Sacramento River south levee. A full description of Alternative 5 can be found in Section 2.5 of the final EIS/EIR.

This alternative is considered practicable and will be retained. An evaluation of the impacts of Alternative 5 will be discussed throughout this document in order to determine if it is the least environmentally damaging practicable alternative (LEDPA).

f. General Description of Dredged or Fill Material

(1) General Characteristics of Material

Fill is required below ordinary high water for the purpose of 1) placement of bank protection along the Sacramento River Levees, 2) installation of seepage berms, 3) construction of adjacent levees, 4) construction of sheet pile walls, 5) constriction of flood walls, and 6) construction of the DWSC Closure Structure.

Fill materials for bank protection, seepage berms, and adjacent levees would consist of large stone riprap to armor the waterside slope. Completion of DWSC Closure Structure would require excavation and dredging of fines, and the placement of the concrete for the control structure. Substrate is mostly fine sand and silt.

The proposed fill for Alternatives 1, 3, and 5 would come from on-site construction or imported fill material.

The no action alternative would result in no changes.

(2) Quantity of Material

An unknown quantity of material would be dredged for the construction of the DWSC closure structure and removed to the designated disposal areas. Approximately 1.5 tons of rock would be placed within the Sacramento River for bank protection under Alternatives 1 and 3, and 2 tons would be placed for Alternative 5.

(3) Source of Material

Potential locations for borrow material, soil maps and land use maps were obtained for a 20-mile radius surrounding the project area. The criteria used to determine potential locations were based on current land use patterns, soil types from Natural Resources Conservation Service (NRCS), and Corps' criteria for material specifications. Borrow sites would be lands that are the least environmentally damaging. Sites would be selected by ensuring absence of wetland plants, soils, or hydrology. Sites with permanent wetlands or waters of the U.S. would not be selected for borrow. In addition, sites with endangered species habit would not be utilized for borrow material. Sites would also be selected and obtained from willing sellers. The data from land use maps and NRCS has not been field verified, therefore, to ensure that sufficient borrow material would be available for construction the Corps looked at all locations within the 20 miles radius for 20 times the needed material. This would allow for sites that do not meet specifications or are not available for extraction of material.

Rip rap for bank protection, seepage berms, and adjacent levees would be imported from a licensed, permitted facility that meets all Federal and State standards and requirements. Concrete material for the sheet pile walls and flood walls would be imported from a licensed, permitted facility or made by the on-site batch plant. The material would be transported along existing roadways and construction access roads.

g. Description of the Proposed Discharge Site

(1) Location

The location of the discharge sites would be in the designated disposal area on the west side of the DWSC and along the waterside levee slopes of the Sacramento River, South Cross levee, and DWSC.

(2) Size

In-water material will be placed at the DWSC, Sacramento River North Levee and South Levee, and South Cross levee. A wetland delineation has not been completed but wetlands and other waters are assumed to be jurisdictional under Section 404 of the Clean Water Act.

Construction activities associated with Alternative 1 would result in the loss of waters of the U.S., including wetlands, as well as upland habitat, vegetation, and the disruption of wildlife movement corridor. It is estimated that a total of 50 acres of seasonal and permanent wetland habitat, 25 acres of oak woodland habitat, 65 acres of riparian habitat, and 21 acres of shaded riverine aquatic cover (SRA) habitat that provide foraging, breeding, and rearing habitat for many fish and wildlife dependent upon vegetation, wetlands, and waters of the U.S. would be significantly affected by the construction activities to improve levees. If a variance is not obtained the impacts to riparian habitat would increase to roughly 94 acres.

Impacts for Alternative 3 would be the same as those discussed for Alternative 1 excluding impacts to the Port north and south levees and to portions of the DWSC east and west levees and including the addition of impacts from the construction of the closure structure in the DWSC. The DWSC closure structure would eliminate the need for construction on the Port north and south levees, the DWSC east levee from the closure structure north, and the DWSC west levee from the closure structure south, which would eliminate the construction related and permanent impacts in those areas. This would eliminate impacts to roughly 14 acres of riparian habitat and 3 acres of SRA habitat. If a variance is not obtained the impacts to riparian

vegetation would increase to 87 acres. The construction of the closure structure would not require the removal of any additional trees along the DWSC east levee, but would impact roughly 100 acres of fallow farmland and 25 acres open water.

Impacts for Alternative 5 would be similar to those discussed for Alternative 1 on all levee reaches except Sacramento River south. The construction of a setback levee in the Sacramento River south area would remove the impacts to waterside and landside vegetation along the Sacramento River south levee. The setback levee would also eliminate the need for construction of a seepage berm on the landside of the existing levee. It would allow vegetation to remain on the existing levee, removing roughly 5.5 miles of impacts and preventing removal of 21 acres of riparian habitat, 9 acres of oak woodland, and 6 acres of SRA habitat. Bank protection would still be placed on the waterside of the existing levee at breach locations to protect the levee in place and reduce hydraulic impacts. Impacts for all other reaches would be the same as discussed in Alternative 1. If a variance is not obtained the impacts to riparian vegetation would increase to 60 acres.

Alternatives 1, 3, and 5 would encompass the same disposal sites. However, Alternative 3 could generate a larger amount disposal material due to the closure structure. The no action/no project alternative would have no have impacts to disposal sites.

(3) Type of Site

The type of disposal site is a waterside levee slopes and river bed, previously disturbed designated dredge disposal sites.

(4) Type of Habitat

The following habitat types were identified at and around the study area. The study area consists of levees plus an approximate 500-foot wide buffer area on the land side of each levee reach.

Natural Communities

Valley Foothill Riparian Habitat. Most valley foothill riparian habitat in the study area (hereafter referred to as "riparian habitat") occurs along the Sacramento River, but smaller riparian areas are found at all of the levees in the study area (Plate 3.6-2 from the final EIS/EIR). The total area encompassed by riparian habitat in the study area is approximately 239 acres. The overstory of the riparian habitat consists of mature, well-established trees: Fremont cottonwood (*Populus fremontii ssp. fremontii*), valley oak (*Quercus lobata*), black willow (*Salix gooddingii*), and box elder (*Acer negundo var. californicum*). During the reconnaissance-level field visits,

Oregon ash (*Fraxinus latifolia*), western sycamore (*Platanus racemosa*), and white alder (*Alnus rhombifolia*) were also observed. The shrub layer consists of smaller trees and shrubs; representative species observed were poison oak (*Toxicodendron diversilobum*), sandbar willow (*Salix exigua*), and Himalayan blackberry (*Rubus discolor*). The riparian habitat in the study area also contains heritage or landmark trees which the City defines as trees with a diameter breast height (DBH) greater than 75 inches, oaks with a DBH greater than 50 inches, and trees with historical significance. Elderberry shrubs (*Sambucus mexicana*), the host plant of the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), which is Federally listed as threatened, were observed in the riparian habitat along the Sacramento River north and south levees. Riparian habitat is listed as a sensitive natural community by the CNDDB (2009).

Grasslands and Prairies. Grasslands and prairies consisting of non-native annual grassland cover approximately half of the study area and encompass a total of approximately 1,178 acres. The largest non-native annual grassland area occurs near the DWSC East, Port south, and DWSC west levees, but grasslands are scattered throughout the study area. The non-native annual grassland is dominated by naturalized annual grasses with intermixed perennial and annual forbs. Grasses commonly observed in the study area are foxtail barley (*Hordeum murinum ssp. leporinum*), ripgut brome (*Bromus diandrus*), Italian ryegrass (*Lolium multiflorum*), and soft chess (*Bromus hordeaceus*). Other grasses observed were wild oats (*Avena spp.*), Bermuda grass (*Cynodon dactylon*), and rattail fescue (*Vulpia myuros var. myuros*). Forbs commonly observed in annual grasslands in the study area are yellow star-thistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), bristly ox-tongue (*Picris echioides*), and sweet fennel (*Foeniculum vulgare*). Other forbs observed are perennial peppergrass (*Lepidium latifolium*), Italian thistle (*Carduus pycnocephalus*), horseweed (*Conyza canadensis*), black mustard (*Brassica nigra*), and fireweed (*Epilobium brachycarpum*). The annual grasslands in the study area contain a relatively large proportion of ruderal species, likely because of substantial disturbance from human activities.

Emergent Wetlands. There are approximately 86 acres of emergent wetlands within the study area. The largest areas of emergent wetlands (hereafter referred to as “marshes”) occur in the vicinity of the Turning Basin along the Port north and Port south levees. Marshes were also observed in the study area near the South Cross, Yolo Bypass, and DWSC West Levees. Smaller patches of freshwater marsh that are not shown at the mapping scale used by the Yolo Natural Heritage Project also have the potential to occur along the remaining levees (Yolo Natural Heritage Project 2009). Representative species observed in marshes in the study area were tules (*Scirpus sp.*), cattails (*Typha sp.*), and rushes (*Juncus sp.*). Marshes in the study area represent potentially jurisdictional waters of the United States (including wetlands)

that may be subject to regulation under CWA Section 404. Marsh habitat (i.e., coastal and valley freshwater marsh) is also recognized as a sensitive natural community by the CNDDB (2009).

Seasonal Wetlands. Four small seasonal wetlands occur in the study area at the eastern end of the Port south levee, totaling approximately 0.3 acre. These wetlands appear to be inundated during wetter times of the year and ongoing and past disturbance contributed to the formation of three of the four seasonal wetlands that appear to have originated from tire tracks within the network of dirt trails in the basin south of South River Road. Representative plant species observed in the seasonal wetlands were hyssop loosestrife (*Lythrum hyssopifolium*), Mediterranean barley (*Hordeum marinum ssp. gussoneanum*), Italian ryegrass (*Lolium multiflorum*), and fiddle dock (*Rumex crispus*).

Woodlands and Forest. Small patches of woodland occur in the study area along the Sacramento River north and Sacramento River south levees, and at the junction of the Sacramento River south and South Cross levees. Woodland and forest encompass approximately 16 acres. These patches of woodland are distinguished from the riparian habitat by a predominance of valley oaks. The woodlands in the study area have a relatively open canopy and contain trees that have the potential to be considered heritage or landmark trees under the City of West Sacramento's Tree Preservation Ordinance.

Open Water. There are approximately 413 acres of open water within the study area. The largest areas are the Sacramento River, DWSC, Turning Basin, and Toe Drain but are not identified in blue due to their size. Smaller areas of open water occur in the study area near the Sacramento River north, DWSC east, Yolo Bypass, Port north, and Port south levees. Open water areas are essentially unvegetated.

Other Land Cover Types

The following land cover types are associated with human activities.

Pasture. Approximately 28 acres of pasture occur in small patches within the study area near the Sacramento River south and Port north levees and provide grazing areas for cattle and horses. Species commonly found in pastures in the region are dallisgrass (*Paspalum dilatatum*), soft chess, and annual bluegrass (*Poa annua*).

Grain and Hay Fields. Small fields used to produce grain and hay are located in the study area near the Sacramento River south levee and encompass approximately 68 acres. Although the specific crops were not discernible during the site visits, they were likely barley, oats, or alfalfa, which are commonly grown in the region.

Deciduous Orchards. Deciduous orchards in the study area are confined to a small area near the Sacramento River south levee that encompasses approximately 6 acres. At the time of the site visits, the area appeared to be unmaintained (i.e., inactive). Although the specific type of orchard crop could not be discerned, it was likely one of the orchard types commonly known from the region: almonds, walnuts, pears, peaches, or plums.

Irrigated Grain Crops. Approximately 20 acres of irrigated grain crops occur within the study area. These areas are associated with the DWSC west levee reach and appear to consist entirely of rice fields.

Irrigated Hay Fields. Two small irrigated hay fields occur in the study area near the South Cross levee and in the southern portion of the Sacramento River south levee. Irrigated hay fields encompass approximately 5 acres in study area. These fields are bounded on at least one side by an agricultural toe drain, which presumably carries water for irrigation of the fields. Although the specific crops were not discernible at the time of the site visits, the fields were likely barley, oats, or alfalfa, which are commonly grown in the region.

Irrigated Row and Field Crops. Irrigated row and field crops occur in the study area along the Yolo Bypass, Sacramento River South, and South Cross Levees and encompass approximately 239 acres. Most of the irrigated row and field crops along the Yolo Bypass Levee appear to be rice fields. At the time of the site visits, the specific crops grown in the remainder of the irrigated row and field crop areas could not be discerned, but they were most likely crops common to the region, such as tomatoes, safflower, sunflowers, melons, or strawberries.

Unvegetated, Vacant, or Developed Areas. Most of the approximately 724 acres that comprise the unvegetated, vacant, and developed areas in the study area occur north of the DWSC along the Sacramento River north, Yolo Bypass, Sacramento Bypass, and Port north levees. Vacant areas within the study area commonly contain ruderal species that have the ability to colonize disturbed areas: bristly ox-tongue, yellow star-thistle, common mallow (*Malva neglecta*), milk-thistle (*Silybum marianum*), prickly lettuce, chicory (*Cichorium intybus*), and perennial peppergrass. Vegetation in developed portions of the study area consists of ornamental species used for landscaping: English ivy (*Hedera helix*), crapemyrtle (*Lagerstroemia indica*), liquid amber (*Liquidamber styraciflua*), edible fig (*Ficus carica*), and privet (*Ligustrum sp.*).

Invasive Plants. Within the West Sacramento study area, invasive non-native plant species occur in all plant communities found within the project area and are rapidly expanding in the riparian zone. Areas dominated by non-native vegetation

are generally associated with recent human disturbance and include: abandoned, fallow, and active agricultural fields, borrow and staging areas, levee slopes, and areas subject to fire, frequent flood inundation, or scour. Non- native weeds dominate some areas, especially where they are found growing along the side slopes of the levees and portions of the construction footprint that are immediately adjacent to the toes of the levees on the land and waterside where the area has been previously disturbed. To a lesser degree where there is low diversity of plants found growing on top of and on the slopes of the levees, invasive plants are also found in other nearby plant communities such as riparian, riparian forest, riparian scrub, oak woodland, agriculture and grassland typically having greater plant diversity.

The areas dominated by invasive herbaceous plant species provide poor habitat quality for native wildlife such as voles, mice, garter snakes, jackrabbits, gophers, and for various native and non-native fish species found temporarily using the riparian zone during periods of inundation. The grassland areas also provide foraging habitat for raptors, coyotes, weasels, common kingsnakes, western rattlesnakes, ground squirrels, southern alligator lizards, and western fence lizards, as well as providing nesting and foraging habitat for migratory song birds. In the more upland areas of a flood plain and in areas extending upslope from it, blue elderberries (*Sambucus cerulea)* and other native shrubs and trees are associated with the grassland area.

Grasslands infested with yellow-star thistle (*Centaurea solstitialis*), pepperweed *(Lepidium latifolium*), and other non-native plants provide limited habitat value, but could be suitable sites for restoring native grasses. Native grasses provide higher value for wildlife. Mature non-native species that are not invasive could hinder and prevent the natural regeneration of native plants in portions of the Sacramento River ecosystem and provide habitat of lesser value to native wildlife species.

Several weed populations such as red sesbania (Sesbania *punicea*) is expanding rapidly along the shorelines of streams and ponds. Chinese tallow tree (*Triadica sebifera)*, a recent invasive, is also expanding in riparian habitats, as are longer established invaders such as arundo (Arundo donax), Pampas grass (*Cortaderia selloana*), Spanish broom (*Spartium junceum*), French broom (*Genista monspessulana*), Himalayan blackberry (Rubus armeniacus*)*, and tamarisk (*Tamarix ramosissima*). Tamarisk can rapidly colonize exposed bar surfaces and stream banks. Other common invasive weed plants include wild oats (*Avena fatua*), soft chess brome (*Bromus hordeaceus*), Italian ryegrass (*Lolium multiflorum*), rip-gut brome (*Bromus diandrus*), fennel (*Foeniculum vulgare*), mare's tail (*Conyza canadensis*), cocklebur (*Xanthium strumarium*), pyracantha (Pyracantha *sp.*), oleander (*Nerium oleander*), poison hemlock (Conium maculatum*)*, mustard (*Brassica tournefortii*),

and foxtail (*Hordeum jubatum*). Chinese tallow tree, black locust (*Robinia pseudoacacia*), Siberian elm (*Ulmus pumila*), Chinese elm (*Ulmus parvifolia*), and tree-of-heaven (*Ailanthus altissima*) are common invasive tree species. These invasive species typically outcompete native plant species and can be introduced via construction equipment in disturbed areas.

(5) Timing and Duration of Discharge

Construction of the project would be conducted over eighteen years, beginning as early as 2017 and continuing through fall 2035. Timing of construction would correspond to low water levels, when feasible, to minimize impacts to water quality.

h. Description of Disposal Method

The description of the disposal methods within the proposed project area are excerpted below from the final EIS/EIR.

Along waterways, such as the Sacramento River, construction from a barge or from heavy equipment on the top of the levee would disturb the aquatic environment and require removal of some vegetation as rock revetment is placed on the slope and into the water where nearshore marsh vegetation could be found. Rock required within the channel, both below and slightly above the water line at the time of placement, would be placed by an excavator located on a barge. The excavator would construct a large rock berm in the water up to an elevation slightly above the mean summer water surface. A planting trench would be established on this rock surface for revegetation purposes. Construction would require two barges: one barge would carry the excavator, while the other barge would hold the stockpile of rock to be placed on the channel slopes.

Alternatives 1, 3, and 5 would utilize similar disposal methods. However, Alternative 3 would also include the disposal of dredged material from the construction of the closure structure at a designated disposal site. The no action/no project alternative would not require the disposal of materials.

II. Factual Determinations

a. Physical Substrate Determinations (Sections 230.11 (a) and 230.20)

(1) Comparison of Existing Substrate and Fill

The description of the current substrate within the proposed project area is taken from Section 3.2 of the final EIS/EIR.

Most of the soils in the project area are shallow to moderately deep, sloping, well-drained soils with very slowly permeable subsoils underlain with hardpan. These soils have good natural drainage, slow subsoil permeability, and slow runoff.

The project area generally consists of deep soils derived from alluvial sources, which range from low to high permeability rates and low to high shrink-swell potential. Soils range from low to high hazard ratings for construction of roads, buildings, and other structures related to soil bearing strength, shrink-swell potential, and the potential for cave-ins during excavation. Soils immediately adjacent to the Sacramento River are dominated by deep, nearly level, well-drained loamy and sandy soils. The natural drainage is good, and the soils have slow to moderate subsoil permeability. The river terraces consist of very deep, well-drained alluvial soils (NRCS, 2007-2012). The porous nature of the soils underneath the existing levee system is an important consideration for the design of levee improvements within the West Sacramento project area.

Kleinfelder (2007) also describes the levee soils and underlying foundation materials based on borings. The levee soils are typically silty sand and poorly graded clean sand. Beneath the levee materials, the typical profile consisted of a layer of fine-grained silt or clay (interpreted to be overbank deposits) underlain by up to 100 feet of sand and gravel, with interbedded silty sand and clayey sand layers. The main exception to the above typical profile is near the downstream end of the South Levee reach, where the levee is on an old railway grade. Drilling here showed a blanket of silt and clay extending at least 20 feet below the levee materials underlain by sand and/or gravel. These were interpreted to be floodbasin deposits, which appear to extend into the stream bank, overlying alluvium. The bottom of the flood basin deposits is at or above the thalweg elevation of the Sacramento River. The presence of these less-erodible deposits is thought to explain the straight, stable bank and narrow river section through the Clay Bend just near the downstream end of the South Levee reach.

Fill material used during project construction would come from borrow sources within a 20 miles radius of the study area and licensed, permitted facilities. Fill material would be of soils and granitic rock origin.

(2) Changes to Disposal Area Elevation

The description changes to the disposal sites within the proposed project area are taken from Section 3.4 of the final EIS/EIR.

The work in Alternative 1 primarily calls for landside fixes of levees that do not change in-channel geometry or characteristics; therefore, the hydraulics of the system does not change. A hydraulic analysis for placement of bank protection in the channel has not been completed at this time. However, during the feasibility level design phase, bank protection was reduced to preserve vegetation and reduce the rock footprint. The current design more closely matches the existing bank and it is anticipated that water surface elevation will not change as a result of the placement of bank protection. The designs will be updated during PED and will be refined to minimize affects to water surface elevation.

The closure structure under Alternative 3 and the resultant change in stages in the DWSC has not been analyzed with a hydraulic model. However, since the DWSC does not convey flood flows and is connected to the Yolo Bypass 15 miles downstream of the project area, it is assumed the water surface elevations in the project area (Sacramento River, Sacramento Bypass and Yolo Bypass) would not change with the addition of a closure structure on DWSC.

Alternatives 5 would cause similar effects as Alternative 1. The no action/no project alternative would not modify the substrate elevation or bottom contours.

(3) Migration of Fill

The description of materials and placement are taken from Section 3.5 of the final EIS/EIR.

Sacramento River North and South levee reaches, the Yolo Bypass, Sacramento Bypass Training levee, and the DWSC levee reaches include cutoff wall construction, bank protection placement, and slope reshaping that would require ground disturbing activities that would potentially cause erosion and soil disturbance, subsequently resulting in sediment transport and delivery to aquatic habitats. An increase in sedimentation and turbidity could occur in adjacent water bodies during earth moving activities and could be considered significant. These indirect effects would be reduced to less than significant with the implementation of BMPs discussed in Water Quality (Section 3.5).

Alternatives 1, 3, and 5 would produce similar impacts on erosion and accretion patterns that would be minimized with the use of BMP's. However, construction of the DWSC closure structure for Alternative 3 would cause greater sediment transportation and turbidity issues due to the additional in water work. Alternative 5 would produce fewer impacts along the Sacramento River south were construction would be setback from the waterway.

The no action alternative would not change any erosion and accretion patterns.

(4) Duration and Extent of Substrate Change

Alternatives 1, 3, and 5 would cause similar impacts to substrate. The proposed action would result in the removal of some native substrate, the permanent placement of rip rap and cause site soils to become compacted. With implementation of BMPs, effects to soil are considered minimal. Alternative 3 would cause additional impacts, increasing sediment transport and turbidity due to the in water construction work for the closure structure. The construction of the graving site and breaching of the levee would also introduce additional sediment into the system (See Section 2.4.2 for additional information). The no action/no project alternative would not modify the substrate.

(5) Changes to Environmental Quality and Value

Evidence of localized, accelerated erosion caused by wave action and channel flows was identified within the study area. Installation of rock slope protection as proposed under Alternative 1, 3, and 5 would substantially reduce bank erosion rates and improve overall levee stability. Construction of Alternative 1, 3, or 5 would cause impacts to vegetation and wildlife habitat, special status species and their habitat, and fisheries resources. Removal of riparian, oak woodland, SRA, and wetlands would reduce the quality of habitat in the area.

Alternative 3 would require dredging for the DWSC closure structure. Disposal sites selected are previously disturbed as designated disposal areas. Placement of material at these locations would be consistent with current land use.

Alternative 5 would cause similar changes in environmental quality and value as Alternative 1.

The no action alternative would not modify the environmental quality and value.

Additional information on vegetation and wildlife, fisheries resources, special status species and impacts to those resources can be found in Sections 3.6, 3.7, and 3.8 of the final EIS/EIR.

(6) Actions to Minimize Impacts

Construction would have minor, short-term impacts. Timing the project to occur during low flow periods and standard erosion prevention practices would be employed such as silt fences to contain turbidity. With the implementation of BMPs and avoidance, minimization, and mitigation measures discussed in Sections 3.5, 3.6, 3.7, and 3.8 of the final EIS/EIR the impacts to erosion and transport of soils and substrate would be minimized.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Alteration of Current Patterns and Water Circulation

Alternative 1 primarily calls for landside fixes of levees that does not alter the existing drainage pattern or stormwater drainage system; place housing within a 100-year flood hazard area; impede and/or redirect flood flows; or expose people or structures to significant risk of loss, injury, or death involving flooding.

The operation of the closure structure under Alternative 3 and the resultant change in stages in the DWSC has not been analyzed with a hydraulic model. However, since the DWSC does not convey flood flows and is connected to the Yolo Bypass 15 miles downstream of the project area, it is assumed the water surface elevations in the project area (Sacramento River, Sacramento Bypass and Yolo Bypass) would not change with the addition of a closure structure on DWSC. The stages and tidal prism in the DWSC downstream of the closure structure would not change; it is assumed when the closure structure is operating, the stages in the DWSC (upstream of the structure) would remain at a non-damaging stage of 16 feet (NAVD88). The operation of the DWSC closure structure will be further refined with the selection of the tentatively selected plan (TSP). The gate operation of the closure structure could be dependent on a number of conditions within the project area.

Due to time constraints, a setback levee under Alternative 5 has not been included in the hydraulic model used for the feasibility study and no stage information is available for direct comparisons of alternatives. The local sponsor has completed a hydraulic analysis with the setback levee as part of the 408 submittal. Based on this analysis, there is a slight increase in stage downstream of the setback at the Pocket (0.13 foot and 0.17 foot rise for the 100-year and 200-year, respectively) that was determined not to be a significant change. If the setback levee is selected as the TSP, the design will be further refined to ensure that the hydraulic impacts are considered to be below an acceptable threshold. The slight change in stage is not expected to impact the economic analysis because it is assumed the Expected Annual Damages (EAD) is not sensitive to small stage increases for less frequent events.

The no action alternative assumes no action would be taken. In the no action scenario, currents, circulation and drainage patterns of system would remain the same.

(2) Interference with Water Level Fluctuation

Because the Sacramento River system and the lower American River system is regulated by upstream dams which allow a specific amount of water to be released into systems, the practicable build alternatives and the no action/no project alternative would not change water level fluctuation patterns.

(3) Salinity Gradients Alteration

Salinity gradients would not be affected.

(4) Effects on Water Quality

The description of the current water quality condition of the study area is taken from Section 3.5 of the final EIS/EIR.

Surface water quality in the region is generally good. Possible types of contamination that can affect water quality include turbidity; pesticides and fertilizers from agricultural runoff; water temperature exceedances; and toxic heavy metals, such as mercury, copper, zinc, and cadmium from acid mine drainage (USGS 2000, DWR 2005). The portion of the Sacramento River within the project area is part of a 16-mile segment from Knights Landing to the Sacramento-San Joaquin Delta that is on the Section 303(d) list for mercury from abandoned mines and toxicity from unknown sources.

(a) Water Chemistry

Project activities involving concrete and concrete wash water have the potential to affect pH, turbidity, and hexavalent chromium in receiving waters. Concrete wash water tends to have relatively high pH (between 10 and 14). Approved BMPs for managing concrete wash water include curing / air drying, off hauling for treatment, and active treatment onsite using carbon dioxide or a stronger acid such as sulfuric or acid. Hexavalent chromium is present in Portland Cement Concrete (PCC) and PCC grindings. Active treatment systems (ATS) targeting pH and turbidity may not remove hexavalent chromium, unless they are augmented with ferrous sulfate or some other chemical agent to reduce hexavalent chromium to trivalent chromium.

Mitigation measures proposed for pH and turbidity would be development and implementation of an approved Stormwater Pollution Prevention Plan (SWPPP), including an ATS if needed to attain water quality objectives. To mitigate for hexavalent chromium risks, the ATS plan would include monitoring and treatment measures to attain no significant increase of hexavalent chromium in receiving waters.

(b) Salinity

The project would not change salinity levels.

(c) Clarity

Dredging and placement of fill materials would temporarily reduce clarity due to an increase in total suspended solids within the project area. Clarity is not expected to be substantially affected outside the immediate project area. However, the reduction of clarity caused by construction activities would be short in duration and would return to pre-construction levels upon project completion.

(d) Color

Dredging and placement of fill materials would temporarily induce a color change due to an increase in turbidity. However, conditions would return to pre-construction levels upon completion of the project.

(e) Odor

The project would not affect odor.

(f) Taste

The project would not affect taste.

(g) Dissolved Gas Levels

The proposed project would have temporary impacts on dissolved gas levels within the project vicinity. Development and implementation of an approved SWPPP would avoid significant negative effects.

(h) Temperature

Construction activities have the potential to create substantial turbidity, thus affecting water temperature. Proposed mitigation measures, specifically, conducting work during low flow periods and installing sediment barriers to reduce sediment from entering waterways would be required to control turbidity and the mobilization of pollutants that may be present in sediments.

(i) Nutrients

Release of suspended sediments from project activities could potentially cause turbidity thresholds to be exceeded. This could concurrently cause thresholds for metals and nutrients to be exceeded. Turbidity would be controlled outside the working area using a combination of BMPS as appropriate.

Development and implementation of an approved SWPPP would also prevent release of excess nutrients.

(j) Eutrophication

The project is not expected to contribute excess nutrients into the stream or promote excessive plant growth due to BMPs and the high content of rock in disposal material.

(5) Changes to Environmental Quality and Value

Alternatives 1, 3, and 5 could impact the water quality during construction from earth moving operations, storage and handling of construction materials on site and the operation and maintenance of construction equipment on-site. Construction and associated materials, including solvents, paints, waste materials and fuels associated with operation and maintenance of construction equipment present on-site could introduce hazardous or toxic materials and silt and debris into surrounding waters, resulting in degradation of the water quality. Although there is risk of substantial effects to water quality during project construction, these effects would be short term and localized within the project area. Effective compliance with BMPs, containment plans, and CVRWQCB water quality thresholds is expected to lower risk of changes to environmental quality and value.

Construction of the DWSC closure structure under Alternative 3 would significantly affect water quality in the DWSC. Construction of the closure structure would require excavation of a graving site to construct the closure structure, construction of a ring levee surrounding the graving site, breaching the existing levee to float out constructed sections, dredging to create a platform for construction, placement of rock in the DWSC, and reconstruction of the levee. This soil disturbance at the graving site could cause sediment runoff into drainage canals that pump water into the DWSC. In addition, the graving site would be opened to the DWSC with the breaching of the levee and the float out of the sections of the closure structure, exposing the DWSC to loose sediment in the graving site and causing increases in turbidity. Construction of the platform in the DWSC would require dredging of material from the channel bottom and placement of that material at a spoils site. Dredging would cause increases in turbidity and suspended solids in the DWSC and could cause water quality issues from runoff at spoils sites. However, these impacts would be considered less than significant with implementation of mitigation measures.

As a beneficial positive effect to water quality under Alternative 5, restoring riparian and SRA habitat and ecological and fluvial functions would improve the water quality for native fish and other wildlife species by: 1) creating a localized incremental increase in DO levels and lowering of water temperatures preferred

by salmonids and other native fish species as SRA increases and the vegetation canopy becomes more diverse over time; 2) providing more root mass in the water column of nearshore areas to trap and filter out the fine sediments compared to current water quality conditions with little to no root mass in the water having negative effects to water quality (e.g., having lower DO and higher water temperature parameters); and 3) providing more hydraulic diversity that improves water quality (increase in DO and lowering of water temperature) benefitting a variety of native fish.

(6) Actions to Minimize Impacts

Construction and excavation would be timed with low water levels when possible to minimize impacts. The impacts to water quality due to construction activities would be minimized by compliance with thresholds of the Section 401 Water Quality Certification, issued by the Central Valley Regional Water Quality Control Board (CVRWQCB).

In addition, proposed mitigation measures would reduce the potential impacts of the proposed project on water quality. These mitigation measures are located in the Water Quality Section (3.5) of the final EIS/EIR.

The contractor would be required to produce compliance plans and implement the proposed mitigation measures during project construction, therefore, impacts to the water quality from project construction are expected to be minimal.

c. Suspended Particulate/Turbidity Determinations

(1) Alteration of Suspended Particulate Type and Concentration

During construction, risk is present for increased levels of turbidity as soils are exposed during rain events. In addition, the dredging of material and placement of fill materials could result in releases of suspended sediments and increased turbidity into the water. Exposed material could be eroded by wave action or storm runoff. The use of best management practices (BMP's), such as utilizing erosion control devices (silt fencing) within the project area, and side slope stabilization of exposed fills would minimize increases in suspended sediments or turbidity associated with the proposed project. Additional information on water quality is found in Section 3.5 final EIS/EIR.

The no action/no project alternative would result in the project not being completed, which would result in no impacts to suspended sediment and turbidity.

(2) Particulate Plumes Associated with Discharge

Earthwork would be performed during low flow periods to minimize particulate plumes. However, particulate plumes could occur from the placement of fill materials but are expected to be contained. Plumes would dissipate after construction activity is completed.

(3) Changes to Environmental Quality and Value

Particulate plumes resulting from any construction activity under Alternative 1 would not persist after project completion. Particulates suspended within the disposal area are not expected to differ in type from particulates currently within the project area.

Under Alternative 3, the indirect effects would be the same as described for Alternative 1, but there could also be long term effects to water quality as the closure structure begins to deteriorate over time. Increased turbidity and metal contamination in the water column as iron or other metals in the closure structure corrodes would also impact water quality. In addition, maintenance activities would disturb the channel bottom during repairs.

The effects from Alternative 5 for the Sacramento River north, Sacramento Bypass, Yolo Bypass, DWSC, Port, and the South Cross Toe Drain would be the same as described above in Alternative 1. Effects along the Sacramento River south levee would be reduced due to the setback levee and the elimination of earth work and bank protection on the existing levee.

(4) *Actions to Minimize Impacts*

Effects would be minimized by performing work during low water level periods when possible. As a result of contractor compliance with the CVWRQCB certification, consistent water quality monitoring, and mitigation measures listed in Section 3.5 of the final EIS/EIR, increases in sedimentation and turbidity are expected to be minimized and temporary.

<u>d. Contaminant Determinations</u>

Construction activities for Alternative 1 would involve the use of hazardous materials such as fuels and lubricants to operate construction equipment and vehicles such as excavators, compactors, haul trucks, and loaders. Bentonite (a non-hazardous material) would be transported to sites where slurry cutoff wall construction would occur.

Impacts for Alternative 3 would be the same as Alternative 1, with the additional affects associated with the DWSC closure structure. Construction of a closure structure in the DWSC includes construction of a graving site to build the structure. The graving site would be excavated in an area that could have previously been used for agricultural purposes. The disturbance of the soil could

result in the release of different types of contaminants that exist in the soil into the environment, and specifically the DWSC during float out of the structure, significantly affecting water quality. These contaminants include pesticides, fertilizers, organic litter, and debris containing hazardous substances. In addition, contaminated dredge material could be exposed during excavation of the DWCS for the placement of the closure structure.

Impacts for Alternative 5 would be the same as Alternative 1 with the reduction in affects associated with the setback levee along the Sacramento River south levee.

Alternatives 1, 3, and 5 involves the use of borrow material. In order to ensure that there are no contaminants within the proposed borrow or fill material, BMPs listed in the Water Quality Section (Section 3.5) of the final EIS/EIR would be implemented. Provided these mitigation measures are implemented by the contractor, there would be minimal impacts to aquatic resources from contaminants.

The no action alternative would result in no impacts due to potential contaminants.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton

Plankton are drifting organisms that inhabit the pelagic zone of oceans, seas, or bodies of fresh water. Construction of the project would be temporary and short termed. With implementation of mitigation measures and BMPS, effects to plankton would be temporary and not significant.

(2) Effects on Benthos

Benthic organisms are found in the benthic zone which is the ecological region at the lowest level of a body of water such as an ocean or a lake, including the sediment surface and some sub-surface layers. Native benthic species would not be affected by the placement of fill material due to their location away from the levee slope where revetment placement would take place. Dredging would result in the complete removal of benthic organisms from the control structure site. Additional information on impacts to benthic organisms is in Section 3.7 of the final EIS/EIR.

(3) Effects on Nekton

Nekton are actively swimming aquatic organisms that range in size and complexity from plankton to marine mammals. Descriptions of fish and other aquatic resources below are from Section 3.7 of the final EIS/EIR.

Native fish present in the West Sacramento study area can be separated into anadromous species and resident species. Native anadromous species include four runs of Chinook salmon, steelhead trout, and green sturgeon. All of these anadromous species are expected to use habitat in parts of the study area. Native resident species include but are not limited to Sacramento pikeminnow (*Ptychocheilus grandis*), Sacramento splittail (*Pogonichthys macrolepidotus*), Sacramento sucker (*Catostomus occidentalis*), hardhead (*Mylopharodon conocephalus*), California roach (*Lavinia symmetricus*), and rainbow trout (*O. mykiss*) and can be found throughout the study area in various aquatic habitats. Additional native and nonnative fish species potentially present in the study area can be seen in Table 3.7-1 of the final EIS/EIR.

Construction during the project may disturb soils and the nearshore environment, leading to increases in sediment in the nearshore aquatic habitat. This in turn may increase sedimentation (i.e., deposition of sediment on the substrate), suspended sediments, and turbidity. Increases in suspended solids and turbidity will generally be short-term in nature and not result in a substantial reduction in population abundance, movement, and distribution.

Due to the common footprints of the three alternatives, the impacts to fish and other aquatic organisms would be similar as for the proposed project. However, additional impacts to fish would result from the in water construction work associated with Alternative 3 and the construction of the DWSC closure structure. In water work would cause additional suspended sediments and turbidity in the DWSC.

The no-action alternative would result in no losses of habitat for fish and other aquatic organisms.

(4) Effects on Aquatic Food Web

Description of ecological effects is taken from Section 3.7 of the final EIS/EIR.

Under Alternative 1, bank protection remediation measures, rock placement and vibration from construction equipment would most likely disturb the native

resident fish by increasing noise, water turbulence, and turbidity, causing them to move away from the area of placement. For some pelagic native juvenile species utilizing the near shore habitat for cover, moving away from that cover could put them at a slight increased risk of predation. Other measures for the Sacramento River North and South levee reaches, including cutoff wall construction, levee raises, and slope reshaping, would be constructed outside of the natural river channel with no direct significant effects to native fish species.

Alternative 3 would have similar effects from bank protection remediation measures as Alternative 1. Additional indirect effects from the permanent closure structure on the Deep Water Ship Channel could have potentially significant effects. During non-operational conditions overwater and in-water structures can alter underwater light conditions and provide potentially favorable holding conditions for adult fish, including species that prey on juvenile fishes. Permanent shading from the installation of piles and other structures in the DWSC could increase the number of predatory fish (e.g., striped bass, largemouth bass) holding in the study area and their ability to prey on resident native fish species.

Alternative 5 bank protection measures would be the same as those discussed for Alternative 1 for the existing levees except for the Sacramento River South levee. There would be a reduction of 6 acres of impacts to SRA habitat and 21 acres of impacts to riparian habitat as a result of the construction of the setback levee. Direct effects associated with a setback levee would not be considered significant because it entails construction of a new levee landward of the existing levee and would avoid construction in the waterside or riparian areas.

Implementation of BMP's and other mitigation measures proposed (Section 3.7) would result in minimal impacts on fish and aquatic wildlife habitat outside the immediate work area.

The no-action alternative would result in no effect to fish and other aquatic organisms.

(5) Effects on Special Aquatic Sites

(a) Sanctuaries and Refuges

No sanctuaries and refuges are within the project area.

(b) Wetlands

It is estimated that a total of 50 acres of seasonal and permanent wetland habitat would be significantly affected by the construction activities

to improve levees. The proposed project would involve the discharge of material and cause the permanent loss to the wetlands on the project site.

Four small seasonal wetlands occur in the study area at the eastern end of the Port south levee, totaling approximately 0.3 acre. These wetlands appear to be inundated during wetter times of the year and ongoing and past disturbance contributed to the formation of three of the four seasonal wetlands that appear to have originated from tire tracks within the network of dirt trails in the basin south of South River Road. Representative plant species observed in the seasonal wetlands were hyssop loosestrife (*Lythrum hyssopifolium*), Mediterranean barley (*Hordeum marinum ssp. gussoneanum*), Italian ryegrass (*Lolium multiflorum*), and fiddle dock (*Rumex crispus*).

(c) Mud Flats

No mud flats are within the project area.

(d) Vegetated Shallows

No vegetated shallows are within the project area.

(e) Coral Reefs

No coral reefs are within the project area.

(f) Riffle and Pool Complexes

No riffle and pool complexes are within the project area.

(6) Threatened and Endangered Species

Implementation of Alternative 1 could result in direct effects to VELB if elderberry shrubs are incidentally damaged by construction personnel or equipment. Impacts may also occur if elderberry shrubs need to be transplanted because they are located in areas that cannot be avoided by construction activities. Potential impacts due to damage or transplantation include direct mortality of beetles and/or disruption of their lifecycle.

The potential to affect giant garter snake and their habitat exists in the Yolo Bypass, Yolo Bypass Toe Drain, Deep Water Ship Channel East and West levee areas, and the South Cross levee area. Construction activities associated with this alternative would result in the loss of waters of the United States, including wetlands, as well as upland habitat and disruption of wildlife movement corridors. Except for the proposed levee work on the water side of the

Sacramento River levees where high flows exclude this snake, this effect would be considered significant because fixing the levee in place would temporarily remove nearshore wetlands and upland habitat that provide suitable habitat ranging between marginal to optimal with low to moderate to high food, cover, and water values for the GGS depending on the quantity and quality of the habitat.

Several special-status birds protected under the Migratory Bird Treaty Act (MBTA) including Swainson's hawk, white-tailed kite, northern harrier, bank swallow, tricolored blackbird, loggerhead shrike, and purple martin have potential to nest in or adjacent to the study area based on reported occurrences within a 10-mile radius.

In the study area, burrowing owls could nest in areas with non-native grasslands intermixed with barren ground and in unvegetated areas at farmland areas having berms or levees nearby. Construction activities, including grading and clearing activities within and adjacent to these lands cover types, could result in nesting failure, death of nestlings, or loss of eggs. In addition to some of the farm areas and larger levees that has burrowing owl habitat, up to 30.9 acres of oak woodland/non-native grassland habitat found on the landside of the levees with suitable soils supporting the nesting and foraging needs of the owl could be adversely affected.

Construction activities such as tree removal and trimming or construction noise could result in significant impacts on roosting hoary, Western red, and pallid bats, including the destruction of active roosts, the loss of individuals, or roost failure and the disruption of the wildlife movement corridor. In addition, nighttime construction activities, if needed, could disturb bats emerging from nearby roosts resulting in the disruption of foraging activities.

Direct and indirect significant effects to Chinook salmon, Central Valley steelhead, green sturgeon, delta smelt, Sacramento splittail, and river lamprey due to loss of SRA and riparian habitat from construction of bank protection activities and implementation of the Corps vegetation policy. Short-term indirect effects on fish species attributable to bank protection activities include water quality effects, such as turbidity and the release of contaminants into the river, and noise and disturbance. Long-term effects on fish habitat include loss of aquatic vegetation and SRA cover. Water quality effects, such as impacts from fuel leaks or contaminants, are detailed in the water quality analysis (Section 3.5).

Under Alternative 3, effects to VELB, GGS, special status migratory bird species, special status bat species, western burrowing owl, and western pond turtle would be the same as described for Alternative 1. The only difference under Alternative 3 would be a reduced impact to these species, because there would be no levee improvements occurring on the Port north levee, Port south levee, and some reaches of the DWSC east and west levees. Impacts to special status fish species from construction of the DWSC closure structure would be primarily due to the preparation of the foundation for the structure, because the closure structure would be constructed in the dry in a graving site adjacent to the DWSC and would be floated into the site upon completion. Activities that could potentially have a significant effect on special status fish species in the DWSC include pile driving of the foundation, increased turbidity during construction, and possible increased predation from the permanent presence of the structure.

Effects to special status species under Alternative 5 would be consistent with those described for Alternative 1. The only difference under Alternative 5 would be the proposed Sacramento River south setback levee rather than standard levee improvements proposed for Alternative 1. By constructing the setback levee, it would reduce the impacts to the riparian corridor along the river by 21 acres, reducing impacts to SRA by 6 acres, and reducing impacts to oak woodland by 9 acres. This would reduce the potential impacts to the majority of the special status species. Additional beneficial positive effects under Alternative 5 include: Restoring riparian and SRA habitat and ecological and fluvial functions would improve the habitat for native fish and other wildlife species by: 1) creating a localized incremental increase in DO levels and lowering of water temperatures preferred by salmonids and other native fish species as SRA increases and the vegetation canopy becomes more diverse over time; 2) providing more root mass in the water column of nearshore areas to trap and filter out the fine sediments compared to current water quality conditions with little to no root mass in the water having negative effects to water quality (e.g., having lower DO and higher water temperature parameters); and 3) providing more hydraulic diversity (increase in DO and lowering of water temperature) benefitting a variety of native fish.

The no action alternative would not result in direct impacts to endangered and/or threatened species.

(7) Other Wildlife

Alternative 1, 3, and 5 could have short-term effects on resident mammals, birds, reptiles, and amphibians. Noise from construction equipment and

increased human presence could temporarily displace some wildlife, and temporary alteration of riparian and aquatic habitat would occur.

To ensure that there would be no effect to migratory birds, preconstruction surveys would be conducted, if needed, in and around the project area. If any migratory birds are found, a protective buffer would be delineated, and USFWS and CDFG would be consulted for further actions. Recommendations proposed by the USFWS in their Fish and Wildlife Coordination Act Report.

The no action alternative would result in no direct impacts to endangered and/or threatened species.

(8) Actions to Minimize Impacts

Many mitigation measures to avoid and minimize impacts to the aquatic environment, as well as, compensatory mitigation measures in order to compensate for unavoidable impacts are proposed. The Corps would also conduct full wetland delineations within and adjacent to the project footprint in the Pre construction Engineering and Design (PED) phase once designs for each reach are developed. Designs would be developed to minimize current impacts to wetlands, but if wetland delineations determine that additional acreages of wetlands would be impacted, the Corps would avoid, minimize, or mitigate for the additional impacts and coordinate the impacts with the appropriate regulating agencies. Mitigation measures are listed in Section 3.5, 3.6, 3.7, and 3.8 of the final EIS/EIR and specifically include avoiding impacts to Waters of the United States to the maximum extent practicable by minimizing footprints in wetland areas, placing staging areas outside of wetlands, and incorporating requirements for avoidance of sensitive habitat within the bid specs.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Size Determination

Not applicable.

(2) Determination of Compliance with Applicable Water Quality Standards

The fill material would not violate Environmental Protection Agency or State water quality standards or violate the primary drinking water standards of the Safe Drinking Water Act (42 USC 300f - 300j). Project design, compliance with State water quality thresholds and standard construction and erosion practices would preclude the introduction of substances into surrounding waters.

The proposed project would not affect existing or potential water supplies, nor would the other alternatives, including the no-action alternative.

(3) Potential Effects on Human Use Characteristics

a) Municipal and Private Water Supplies

The fill material would not violate Environmental Protection Agency or State water quality standards or violate the primary drinking water standards of the Safe Drinking Water Act (42 USC 300f – 300j).

Project design, compliance with State water quality thresholds and standard construction and erosion practices would preclude the introduction of substances into surrounding waters. Materials removed for disposal off-site would be disposed of in an appropriate landfill or other upland area.

b) Recreation and Commercial Fisheries

The study area is heavily used for recreational fishing. A description of these game fish is provided in the EIS/EIR Fisheries, Section 3.7.

Temporary disruption of these activities would occur during construction activities when the levee crown and adjacent construction and staging areas are closed to public access. Even if the recreation areas themselves are not closed, proximity to construction equipment and activities may degrade recreational experiences. However, this effect is temporary and there are alternative locations for these types of recreation activities in the city.

Alternatives 1and 5 would result in similar impacts to recreational fisheries. Alternative 3 would result in additional impacts to recreational fisheries during in water construction of the closure structure. Portions of the DWSC would be closed to recreational access during in water construction, but the effects would be temporary.

The no-action alternative would result in no impacts to recreational fisheries.

c) Water-related recreation

In addition to recreational fishing, the study area is a popular location for picnicking, swimming and boating. Under Alternative 1 the placement of bank protection may require in-channel construction activities that could temporarily disrupt recreational boating and personal watercraft use including removal of some vegetation for rock placement. If the bank protection design incorporates a rock bench, in-channel construction

activities are likely to occur. Temporary disruption of recreational boating would result from the presence of construction vehicles, equipment, and personnel in and adjacent to the Sacramento River, as well as temporary construction effects on channel water quality (i.e., increased turbidity from suspended materials).

The Broderick Boat Ramp, located north of the I Street Bridge, is West Sacramento's only vehicle-accessible boat ramp, and provides the Sacramento region's only free, vehicle-accessible boat launch facility. Visitors must use the levee road to access the boat ramp, but temporary closure of the levee road may be necessary during project construction activities. Closure of the boat launch facility would conflict with the City's Department of Boating and Waterways (DBW) grant agreement requiring prior approval from the DBW before closing the facility to any recreational vehicle and reducing access to recreational boating opportunities in the project vicinity. However, with implementation of the avoidance, minimization, and mitigation measures below to preserve marina and boat launch access and to obtain approval for Broderick Boat Ramp closure.

Much of the recreation activity along the Port south levee occurs at the Barge Canal Recreational Access, a formal, City of West Sacramento facility. Because the boat ramp at the Barge Canal Recreational Access is the only public boat access to the barge canal or DWSC, temporary closure of this facility would block public boating access to these waters. The levee raise in this area would require removal of features on the landside of the levee to accommodate the landward expansion of the levee footprint. This could have permanent effects on the Barge Canal Recreational Access. However, with the implementation of the avoidance, minimization, and mitigation measures in Section 3.14.7 of the final EIS/EIR would reduce this effect.

In addition to the formal recreation facility (Sam Combs Park) located along the landside of the Port north levee, UC Davis and the River City Rowing Club operate rowing facilities and the Lake Washington Sailing and Outboard Clubs operate private water access areas out of the Port of West Sacramento. Other recreational use on or near the Port north levee is very limited, because most of the land is owned by industrial enterprises and access is restricted. Temporary disruption of these activities could occur during construction activities when the levee crown and adjacent construction and staging areas are closed to public access. Recreational boating on the barge canal and activities that take place in Sam Combs Park may be indirectly affected by proximity to construction equipment and construction activities that could degrade recreational experiences.

The Sacramento Yacht Club and the Sherwood Harbor Marina and RV Park are both located on the waterside of the Sacramento River south levee. These are the only two marinas located in West Sacramento. Both offer a large number of boat slips, and Sherwood Harbor is the only riverfront RV park in the Sacramento metropolitan area. Visitors must use the levee-top road (South River Road) to access the marinas, but temporary closure of the levee road may be necessary during project construction activities. Closure of the City's only marinas would substantially reduce the availability of existing recreational boating opportunities in the project vicinity.

The calm waters of the DWSC provide a unique recreation opportunity for non-motorized boaters, regional rowing clubs, and local sailing and outboard motor clubs. Temporary disruption of recreational boating would result from the presence of construction vehicles, equipment, and personnel in and adjacent to the DWSC, as well as temporary construction effects on channel water quality (i.e., increased turbidity from suspended materials).

Much of the recreation activity along the Port south levee occurs at the Barge Canal Recreational Access, a formal, City of West Sacramento facility. Because the boat ramp at the Barge Canal Recreational Access is the only public boat access to the barge canal or DWSC, temporary closure of this facility would block public boating access to these waters. The levee raise in this area would require removal of features on the landside of the levee to accommodate the landward expansion of the levee footprint. This could have permanent effects on the Barge Canal Recreational Access.

The impacts on recreation for Alternative 3 would be the same as those discussed in Alternative 1, with the addition of impacts associated with the construction of the DWSC Closure Structure. The construction of the DWSC Closure Structure would cause temporary disruption of recreational access to the DWSC for the UC Davis and the River City Rowing Clubs and the Lake Washington Sailing and Outboard Clubs out of the Port of West Sacramento. Public access to the DWSC via the Barge Canal Recreational Access point would also be temporarily unavailable.

Alternative 5 would have similar impacts to other water related recreation as Alternative 1.

The no-action alternative would result in no impacts to other water related recreation.

d) Aesthetics

The major roads leading into West Sacramento and downtown Sacramento act as gateways and offer unique vistas of the contrasting landscape features. High rise buildings that can be seen over agriculture fields and residential development are softened by riparian corridors that line the waterways.

Construction activities under Alternative 1 would introduce considerable heavy equipment and associated vehicles, including dozers, graders, cranes, scrapers, and trucks into the views of adjacent residents, recreationists, motorists, and businesses. The equipment would be visible throughout the construction season. Presence of the equipment would temporarily degrade the visual quality of the study area. The construction impacts on aesthetics would be temporary, and would primarily affect local residents or recreationists in the immediate vicinity.

Construction has the potential to substantially degrade the existing visual character or quality of the levee reaches and surroundings for viewer groups for two other reasons: 1) a new levee embankment or flood structure (e.g., flood wall, adjacent levee raise, setback levee) would be present, and 2) construction would require the removal of all vegetation on the landside of the levees and the upper portion of the waterside of the levee. Depending on location and existing conditions, the addition of flood structures could degrade the visual character of the area and obstruct views. For example, a flood wall constructed along the Port north levee could obstruct views of the DWSC and Barge Canal and change the quality of the visual character of these areas. This would be considered a significant and potentially unavoidable effect.

Impacts for Alternative 3 would be the same as those discussed for Alternative 1 with the addition of visual impacts from the construction of and presence of the closure structure in the DWSC. Construction of the closure structure would introduce additional heavy equipment and associated vehicles, including dozers, graders, cranes, scrapers, and trucks into the DWSC east levee area. Residents, recreationists, motorists, and businesses would be exposed to visual impacts from equipment. Construction has the potential to permanently degrade the existing visual character or quality of the area for viewer groups because a new structure would be present in the DWSC. The addition of the closure structure could degrade the visual character of the area and obstruct views.

Alternative 5 would have the same effects as those of Alternative 1 with changes in impacts along the Sacramento River south levee due to construction of the setback levee. The construction of a new levee would change the visual character of this area for residents, motorists, and recreationists. The no-action alternative would not alter the aesthetics and therefore would have no impacts.

e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves.

Not applicable.

g. Determination of Cumulative Effects on the Aquatic Ecosystem

Effects of the proposed action include reductions in nearshore aquatic and riparian habitat that is used by aquatic and terrestrial species. Placement of revetment on earthen banks alters natural fluvial processes that sustain high-value nearshore and floodplain habitats in alluvial river systems.

A number of other commercial and private activities, including hatchery operations, timber harvest, recreation, as well as urban and rural development, could potentially affect listed species in the Sacramento River basin. Levee maintenance activities by state agencies and local reclamation districts are likely to continue, although any effects on listed species will be addressed through Section 10 of the ESA. Ongoing non-federal activities that affect listed salmonids, Green Sturgeon, Delta Smelt, valley elderberry longhorn beetle, giant garter snake and their habitat, will likely continue in the short-term, at intensities similar to those of recent years. However, some activities associated with the State's proposed Central Valley Flood Protection Plan or state or local efforts to implement the ETL could result in increased effects on listed species.

Potential cumulative effects on fish may include any continuing or future non-federal diversions of water that may entrain adult or larval fish or that may incrementally decrease outflows, thus changing the position of habitat for these species. Water diversions through intakes serving numerous small, private agricultural lands and duck clubs in the Delta, upstream of the Delta, and in Suisun Bay contribute to these cumulative effects. These diversions also include municipal and industrial uses and power production. Several new diversions are in various stages of action. The introduction of exotic species may also occur under numerous circumstances. Exotic species can displace native species that provide food for larval fish.

Potential cumulative effects on all species discussed above could include: wave action in the water channel caused by boats that may degrade riparian and wetland habitat and erode banks; dumping of domestic and industrial garbage; land uses that result in increased discharges of pesticides, herbicides, oil, and other contaminants; and conversion of riparian areas for urban development. In addition, routine vegetation clearing and mowing associated with agricultural practices may affect or remove habitat for the valley elderberry longhorn beetle and giant garter snake.

h. Determination of Secondary Effects on the Aquatic Ecosystem

Under Alternative 1, 3, and 5 the existing levee structures would be degraded by one half to create a working platform for slurry wall installation. As the levee is degraded, all vegetation on the top half will be removed. Since these trees are located on the top half of the levee, they provide a small amount of SRA habitat, as well as habitat for many avian species. On the waterside of the levee there is little understory vegetation on the top half of the levee due to maintenance activities.

The placement of rock would not only reduce the risk of erosion, but would also anchor remaining trees in place and reduce the potential for trees falling over during a high flow event. The understory, which provides habitat for small rodents, ground nesting birds and waterfowl, and various reptiles, would be removed in order to provide a clean surface to place the rock.

Because the revetment is a hard surface it would not support the growth of large amounts of vegetation. However, some areas where revetment has been placed in the past do have berry vines and wild grape growing over the revetment and creating a low understory. In areas with a soil trench or soil placed over rock on the lower portion of the slope vegetation would be planted or allowed to establish naturally. The revetment would also provide basking areas for some small reptiles such as snakes and lizards. Because the riparian corridor and shaded river aquatic habitat left in place would still provide value to fish and wildlife species, and mitigation would be implemented for trees that were removed, impacts are consider less than significant.

On the landside of the levee all trees would be removed from the levee slope and within 15 feet of the levee toe to comply with the Corps ETL. Within this 15 feet, a 10-foot landside operations, maintenance, and

emergency access corridor would be established. If a vegetation variance is not received impacts to riparian habitat would be increased.

Risk exists for unintentional placement of dredge and/or fill material to be conducted outside of the proposed project area. Unintentional placement could result in additional adverse impacts to water quality, erosion and accretion patterns, aquatic and other wildlife habitat, recreation, aesthetics and air quality. In order to reduce the risk of such impacts, contract specifications would require the contractor to mark the project boundaries, and that the contractor install erosion control (i.e. silt fencing, silt curtains) where possible within any standing waters.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

(1) No significant adaptations of the guidelines were made relative to this evaluation.

(2) No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States.

(3) The discharges of fill materials will not cause or contribute to, after consideration of disposal site dilution and dispersion, violation of any applicable State water quality standards for waters. The discharge operations will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

(4) The placement of fill materials in the project area(s) will not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973.

(5) With the implementation of BMPs, avoidance, minimization, and mitigation measures discussed in Sections 3.5, 3.6, 3.7, and 3.8 of the final EIS, the placement of fill materials will not result in significant adverse effects on human health and welfare, including municipal and private water supplies; recreational and commercial fishing; fish, shellfish, and wildlife populations and habitat, and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected in the Sacramento River. Temporary inhibition of life stages will occur within a localized project area.

Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

(6) Appropriate steps to minimize potential adverse effects of the discharge on aquatic systems will be implemented through implementation of BMPs, avoidance, minimization, and mitigation measures discussed in Sections 3.5 of the final EIS/EIR.

(7) On the basis of the guidelines the proposed disposal site for the discharge of dredged material is specified as complying with the requirements of the guidelines with the inclusion of appropriate and practicable conditions to minimize pollution or adverse effects to the aquatic ecosystem.